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NOTES ON *CEREUS* AND *ACANTHOCEREUS*

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It is commonly believed that the greatest single difficulty of the classification of the Cactaceae is in the fact that many names were published in this family for which types are not extant. This difficulty is great, no doubt, but less fundamental than it seems. Under the current Rules of International Nomenclature, 1935, names ambiguous on account of their having been used with different meanings *(Nomina ambigua.* Art. 62), names of uncertain application *(Nomina dubia,* Art. 63), and names described from material originating in different plants *(Nomina confusa.* Art. 64) may be rejected regardless of priority in publication. Since no one may change a name without serious motives, based either on a more profound knowledge of facts, or on the necessity of giving up a nomenclature that is contrary to the Rules (Art. 17), tainted names can always be treated in a manner that favors stability of nomenclature, this being the highest purpose of the Rules (Art. 4 |1|) . It will not occur to a sound taxonomist working on the Cactaceae to resuscitate old and forgotten names and to upset existing usage without very cogent reason. In a definite sense, the nomenclature of the Cactaceae is fairly well stabilized insofar as thousands of "old names" have already been stored away into synonymy, and have thus received a meaning in classification.

In my opinion, the classification of the Cactaceae is difficult especially on account of the following: (1) A great range of variability within the species, and a lack of sharp boundaries between the genera; (2) Our present ignorance of essential factors of distribution; (3) A complete neglect of morphological studies on the part of early and modern authors who have used as generic characters features such as the cephalium which they made no effort to define and even less to understand; (4) A failure on the part of Britton and Rose, whose work on the Cactaceae is of the utmost importance, to abide by the International Rules of Nomenclature. Their subtribal names ending in *anae,* for instance, are a flat violation of Art. 24 of these Rules. Less apparent, but more fundamental—as it will be seen—is their arbitrary use of typification; (5) A stale traditionalism in German work up to 1933, on account of the pressure exerted upon scientific classification by cactus fanciers and dealers, unwilling to see changes in generic names but more than ready to publish species of doubtful value by the score. It seems incredible that Vaupel's statement that the nomenclature of the Cactaceae is a law unto itself could find a place in the pages of the Natürliche Pflanzenfamilien of Engler and Prantl *(op. cit.* 21: 613. 1925).

In view of these difficulties, it is necessary once for all to deal here with certain phases of classification that seem at first to be unrelated with the subject under present consideration but vitally concur to its elucidation. *Cereus* was published by Miller (Gard. Dict. Abridg. ed. 4. 1754) with the inclusion of a number of species which later authors have distributed among three to five genera. This concept was maintained by Haworth who, in the main, published subdivisions having a descriptive purpose, witness (Syn. Pl. Succ. 178-186. 1812): *Quadrangulares Erecti, Parvangulares Prostrati,* and the like. This concept, widely accepted for nearly a century, was finally broken in 1909 by the works of Riccobono and Britton & Rose, as it will be seen.

Engelmann is the first student of the Cactaceae to publish under *Cereus* subgenera in the modern manner. In 1856 (in Proc. Amer. Acad. Sc. 3: 278-288; Bot. Works, edit. Trelease & Gray, 136-140. 1887) he designated as subgenera of *Cereus* four subdivisions: *Echinocereus, Eucereus, Lepidocereus* and *Pilocereus*. The diagnosis of *Eucereus* reads as follows: "Caulis elongatus: fasciculi aculeorum steriles et florigeri similes; floris tubus elongatus, saepissime aculeolis capillaceis munitus; stigmata pallida; semina laevia seu raro rugosa; embryo hamatus". Three species are included under this subgenus, *C. Emoryi, C. variabilis* sensu Engelm., and *C. Greggii* with two varieties. In a remarkable discussion published seven years later (in Acad. Sc. St.-Louis, Trans., 2: 203-204. 1863; Bot. Works, edit. Trelease & Gray 225-226. 1887), Engelmann showed himself inclined to break up *Cereus* into a number of groups of unspecified status, taking up, for instance, such names as *Echinopsis* Zucc. and *Phyllocactus* Link, but failing to use them in a clean-cut manner. On this occasion, Engelmann published *Acanthocereus,* evidently meant as a subgeneric group of uncertain rank, adding that he included under it "The species of this division with spiny fruit, but not belonging to *Echinocereus*". He also rejected his previous interpretation of *C. variabilis,* commenting that the plant he had so identified by error in 1856 had been found by Poselger to be the same as one from Tampico, Mexico, which was *C. princeps* Pfeiffer. Accordingly, *Cereus princeps* Pfeiffer, En. Cact. 108. 1837, is the first legitimate name borne by the Texan cactus now usually called *Acanthocereus pentagonus* (L.) Britton & Rose.

Schumann followed at first Engelmann's approach to the classification of the cereoid group, publishing two Sections, *Eucereus* and *Microcereus* (in Mart. Fl. Brasil. 4 (2): 196. 1890), which are a mixture of unrelated species, the former including both Engelmann's and Britton & Rose's concept of *Cereus.* Soon thereafter, he changed his mind (in Engl. & Prantl Nat. Pflanzenf. 3 (6): 176-179. 1894), and returned to a classification based upon "Reihe" bearing descriptive titles in the manner of Haworth and Salm-Dyck. This he maintained in his classic monograph (Gesamtbeschr. Kakt. 47-56. 1897) in which no mention is found either of Engelmann's Subg. *Eucereus* or of his own, Schumman's, Section of the same name. Less than ten years after the publication of Schumann's work, Alwin Berger published a fundamental study of *Cereus* (in Missouri Bot. Gard. 16: 57-86, pl. 1-12. 1905), in which he accepted the classification of Engelmann, using Subg. *Eucereus,* but failing, unfortunately, to take up Schumann's Sect. *Eucereus* which he appears to have overlooked. Under *Eucereus* as a subgenus he placed as "subsections" (almost certainly an oversight, meaning sections) *Nyctocereus, Selenicereus, Peniocereus, Acanthocereus, Heliocereus* adn *Phyllocereus* (pp. 75-78). It is worth remarking that "subsect." *Acanthocereus* is typified by Berger with reference to "*Cereus (Acanthocereus) Baxaniensis* Karw. (in Pfeiff. En. Cact.) 98 (*C. princeps* Hort. = *C. acutangulus* Otto = *C. variabilis* Engelm.). *Cereus princeps* is validly published by Pfeiffer, and Berger's reference is not complete. Since *C. baxaniensis* and *C. princeps* were both contemporaneously published, Berger's designation of the former as valid is binding under Art. 56 of the current Rules.

In 1909 the work begun by Berger was continued by Britton and Rose (in Contr. U. S. Nat. Herb. 12 (10): 413-437. July), and by Riccobono (in Boll. Ort. Bot. Palermo 8: 215-266. October-December). Riccobono maintained *Cereus* in the sense of Engelmann and Berger (p. 246), placing under it in synonymy *Eucereus, Nyctocereus, Selenicereus, Peniocereus, Acanthocereus, Heliocereus, Phyllocereus* as defined by Berger, and *Selenicereus* of Britton & Rose. Britton and Rose, on the contrary, for reasons better known to themselves, decided to subvert the concept of *Cereus* that had been current since 1856. They decided that *Nyctocereus, Selenicereus, Peniocereus, Acanthocereus, Heliocereus* should stand as good genera; that *Cereus* should be restricted to the group called by Berger and Riccobono *Piptanthocereus,* and be typified by *C. peruvianus* Miller; that *Acanthocereus* should be typified by *A. pentagonus* (L.) Britt. & Rose, based upon the meaningless *Cactus pentagonus* of Linnaeus. *Eucereus* they simply ignored, *precisely as if it had never been published or used before;* it is mentioned incidentally in their later work (Cact. 2: 3, 117. 1920), but this is all.

Since *Eucereus* cannot be ignored nor be made to disappear, and shall forever remain as the type-subgenus of *Cereus,* the arbitrary and superficial disposition made of it by Britton and Rose places a conservative and critical student before a dilemma, from the solution of which depends a great deal of *practical nomenclature.* This is the dilemma: **(1)** *Eucereus* is retained in the sense of Engelmann, Berger and Riccobono. Owing to the fact that *Eucereus* is the typic subgenus, the type-species or standard species must be chosen under it. This means that *Cereus* can be typified only by *C. Emoryi, C. baxaniensis* Pfeiffer (species lectotypica Berg. 1905 = *C. variabilis* Engelm, non alior.) or *C. Greggii,* which typify or exemplify three of the genera of Britton & Rose, *Bergerocactus, Acanthocereus* and *Peniocereus.* Riccobono's *Piptanthocereus,* moreover, is to replace *Cereus;* **(2)** *Eucereus* is ignored, in the style of Britton & Rose. This means that *Eucereus,* although validly published, and current in much sound literature, cannot be applied in the sense in which it has traditionally been current, if indeed at all.

Up to a comparatively recent past, German students of the Cactaceae firmly stood by Berger's understanding of *Cereus,* rejecting Britton & Rose's classification. Werdermann, for instance, (in Fedde Repert. 29: 234 *et seq.* 1931) maintains *Cereus* subg. *Eucereus* in the sense of Berger, and accepts *Acanthocereus pentagonus* Britt. & Rose merely as a synonym of *C. undulosus* DC. (*) To the taxonomist not fully informed about the classification of the Cactaceae, it may seem

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(*)—see page 137.

that Werdermann and Britton & Rose disagree as to whether *Acanthocereus* can or cannot be properly segregated out of *Cereus*. This is not the issue actually at stake. The point is that Britton and Rose enforce one standard of typification which is widely different from that accepted by Werdermann, much nomenclature of *Cereus* depending upon this standard.

Had Werdermann maintained his opinion of 1931 throughout, it should be easy today to uphold his concept of *Cereus*, for this concept is strictly correct and consistent both nomenclaturally and historically. Werdermann changed his mind, however, and eventually accepted (Brasil. Säulenkakt. 84 *et seq.* 1933) Britton & Rose's understanding of *Cereus, Acanthocereus* and other genera. Backeberg, too, who is a practical collector rather than a trained botanist, but has exerted and still is exerting a great deal of influence upon the nomenclature of the Cactaceae, subscribes to the generic and typologic concepts of Britton and Rose (in Backeberg & Knuth, Kaktus-ABC 179 *et passim.* 1935). An agreement so dearly won and so long overdue among weighty authors should not now be broken by a return to forms of nomenclature that, correct as they are, call for new combinations and new nomenclatural changes. Engelmann's definition of *Eucereus* is not absolutely incompatible with Britton and Rose's use of *Cereus,* because the note that would radically conflict with the characters of this genus in the sense of Britton and Rose ("Floris tubus elongatus, saepissime aculeolis capillaceis munitus") is fortunately qualified by the adverb "saepissime". True, violence must be done to the accepted principles of typification in this subgenus, which—by Britton and Rose's misinformed decision—now stand under *Bergerocactus, Acanthocereus* and *Peniocereus*. The subgenus *Eucereus,* consequently, is to be typified by *C. peruvianus* Mill. in order to agree with the concepts—now dominant—of Britton and Rose, Werdermann and Backeberg. This is also true of Schumann's Sect. *Eucereus* which, by a basic requirement of typification, cannot rest on another species. The current Rules of Nomenclature are absolutely silent on what is to be done in cases like the present, and an author is free to act under Art. 5 of these Rules, adopting a solution which conforms with "good usage". Such an "usage" is bound to protect existing nomenclature, for stability in names is the fundamental purpose, (Art. 4 |1|) of taxonomy. It should be noticed that as early as 1905 it was admitted that generic names can be conserved *in a wholly misapplied sense* (see, for example, the *nomina conservata: Podocarpus* and *Phyllocladus*). Subgeneric names cannot be conserved, but I do not doubt that to avoid irreparable injury to existing nomenclature, validly published subgeneric names such as *Eucereus* can be interpreted on the word of the diagnosis, deeming the indication of certain species as typic to be— in isolated cases— of secondary importance. The matter is one which the coming Botanical Congress will have to decide, and there is no doubt that Art. 18 of the current Rules must be rewritten, providing for cases like the one under discussion. In conclusion, I follow Britton and Rose, Werdermann and Backeberg, in accepting *Cereus* as the equivalent of *Piptanthocereus,* and *Acanthocereus* as a valid, distinct genus, with a clear urderstanding of the objectionable sides of the classification advanced by these authors.